Girsanov Theorem

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Abstract

Modern theory of probability and financial mathematics require the theory of stochastic calculus. Its foundations contain Wiener process (Brownian motion) and the integral of stochastic process with respect to another stochastic process. This thesis deals with building the mathematical theory needed to construct the stochastic integral, with the construction itself, the Girsanov Theorem and its applications. The Girsanov Theorem uses equivalent probability measure to transform Wiener process with drift to Wiener process without drift. Using the Girsanov Theorem, we change our measure to the equivalent risk neutral measure and we deduce Black–Scholes formula which estimates the prize of European call option with underlying stock asset. The stock prize is modelled using the geometric Brownian motion. Finally, we demonstrate, on real life data, how this model works and what are its outcomes.